

REMARKS

Reconsideration and allowance are respectfully requested in view of the foregoing amendments and the following remarks. Claims 3-4, 6, 10, and 32-33 have been amended. Claims 5, 7, 12-13 have been withdrawn from consideration. Claims 1, 3-4, 6, 8-11, and 21-38 are currently pending.

In the Office Action, claims 3-4 stand rejected under 35 U.S.C. 112, second paragraph, as being indefinite because they depend upon cancelled claim 2. Applicant has amended claims 3 and 4 to be dependent upon independent claim 1. In view of the foregoing, Applicant respectfully requests withdrawal of the 35 U.S.C. 112, second paragraph, rejection of claims 3 and 4.

Claims 1, 3, 6, 21, 25-26, 29-32, and 37 stand rejected under 35 U.S.C. §103 as being unpatentable over U.S. Patent No. 5,901,037 to Hamilton et al. ("Hamilton '037") in view of U.S. Patent No. 5,692,558 to Hamilton et al. ("Hamilton '558"). The Office Action alleges that Hamilton '037 discloses, in at least Figures 3 and 12, all of the features of the invention with the exception of the member being metal. Applicant respectfully disagrees with the Office Action's characterization of Hamilton '037. Hamilton '037 describes a cooling system for an RF transistor module that includes a plurality of elongated microchannels connected between a pair of manifolds for conducting liquid coolant beneath one or more transistor dies to dissipate generated heat. The system is further described as including a heat exchanger, a miniature circulating pump, and passive check valves having tapered passages for controlling the flow of coolant in a loop.

In regard to independent claim 1, Applicant submits that Hamilton '037 fails to teach or suggest at least the features of claim 1 of a "cavities inlet end cap interconnecting the micro tube inlets in fluid communication and connecting the micro tube inlets in fluid communication with said inlet tube" or a "cavities outlet end cap interconnecting the micro tube outlets in fluid communication and connecting the micro tube outlet in fluid communication with said outlet tube." Hamilton '037 describes in Figure 12 the use microchannels 16 that terminate in an input manifold 18 at one end and an output manifold 20 at another end. As illustrated in Figure 10, the input manifold 18 and output manifold 20 are formed within the substrate material 14 of the

(18, 20)
'037
cavities
inlet & outlet
caps

transistor module 10, and do not function as endcaps. Accordingly, Applicant submits that there is no teaching or suggestion by Hamilton '037 that the input manifold 18 and output manifold 20 can be analogized to the "cavities inlet end cap" and "cavities outlet end cap" of claim 1.

The Office Action admits that Hamilton '037 fails to teach or suggest a low profile unitary member being of metal. The Office Action refers to column 2, lines 30-32 as describing "a heat exchanger/member made from metal for the purpose of efficiently removing heat from a heat generating device" and indicates that "it would have been obvious at the time the invention was made to a person having ordinary skill in the art to employ in Hamilton et al. ('037) a heat exchanger/member made from metal for the purpose of efficiently removing heat from a heat generating device as disclosed in Hamilton et al. ('558)." However, Applicant respectfully submits that Hamilton '558 fails to cure the deficiencies of Hamilton '037. In particular, Applicant submits that Hamilton '558 also fails to teach or suggest the "cavities inlet end cap" and "cavities outlet end cap" of claim 1. In view of the foregoing, Applicant respectfully submits that independent claim 1 distinguishes over Hamilton '037 in view of Hamilton '558 and requests that the 35 U.S.C. §103 rejection of independent claim 1 be withdrawn.

Independent claim 21 includes the features of a "cavities inlet end cap interconnecting the micro tube inlets in fluid communication" and a "cavities outlet end cap interconnecting the micro tube outlets in fluid communication." For similar reasons as those discussed with respect to independent claim 1, Applicant respectfully submits that independent claim 21 distinguishes over Hamilton '037 in view of Hamilton '558 and requests that the 35 U.S.C. §103 rejection of independent claim 21 be withdrawn.

Claims 3, 6, 25-26, 29-32, and 37 are dependent upon and include the limitations of their respective independent claims 1 and 21. For at least the reasons as discussed with respect to independent claims 1 and 21, Applicant respectfully submits that claims 3, 6, 25-26, 29-32, and 37 distinguish over Hamilton '037 in view of Hamilton '558 and requests that the 35 U.S.C. §103 rejection of claims 3, 6, 25-26, 29-32, and 37 be withdrawn.

Claim 4 stands rejected under 35 U.S.C. §103 as being unpatentable over Hamilton '037 in view of Hamilton '558 as applied to claims 1, 3, 6, 21, 25-26, 29-32, and 37 above, and in further view of Applicant's omission of known/conventional prior art. The Office Action

alleges that “Hamilton ‘037 as modified, discloses all the claimed features of the invention with the exception of a plated metal.” The Office Action further alleges that “Applicant’s omission of known/conventional prior art in his specification on page 7 discloses that it is known to have a second material between the heat exchanger and the component for purpose of reducing thermal resistances and attaching the component to the heat exchanger.” The Office Action further alleges that “it would have been obvious at the time the invention was made to a person having ordinary skill in the art to employ in Hamilton et al. (‘037) as modified, a second material between the heat exchanger and the component for the purpose of reducing thermal resistances and attaching the component to the heat exchanger as known by Applicant’s omission of known/convention prior art.” Claim 4 is dependent upon an includes the limitations of independent claim 1. For at least the reasons as discussed with respect to independent claim 1, Applicant respectfully submits that claim 4 distinguishes over Hamilton ‘037 in view of Hamilton ‘558 and requests that the 35 U.S.C. §103 rejection of claim 4 be withdrawn.

Claims 8-9, 27-28, 33, and 38 stand rejected under 35 U.S.C. §103 as being unpatentable over Hamilton ‘037 in view of Benson et al. The Office Action alleges that Hamilton ‘037 “discloses all the claimed features of the invention with the exception of a fin.” The Office Action further alleges that Figure 6 of Benson et al. discloses that “it is known to have a fin in micro tubes for the purpose of increasing the heat transfer efficiency of the micro tube.” The Office Action still further alleges that “it would have been obvious at the time the invention was made to a person having ordinary skill in the art to employ in Hamilton et al. (‘037) a fin for the purpose of increasing the heat transfer efficiency of a micro tube as disclosed in Benson et al.”

In regard to independent claim 8, Applicant submits that Hamilton ‘037 fails to teach or suggest at least the features of claim 8 of a “cavities inlet end cap interconnecting the micro tube inlets in fluid communication and connecting the micro tube inlets in fluid communication with said inlet tube” or a “a cavities outlet end cap interconnecting the micro tube outlets in fluid communication and connecting the micro tube outlet in fluid communication with said outlet tube.” As discussed in regard to claim 1, the input manifold 18 and output manifold 20 of Hamilton ‘037 are formed within the substrate material 14 of the transistor module 10, and do not function as endcaps. Accordingly, Applicant submits that there is no teaching or suggestion

by Hamilton '037 that the input manifold 18 and output manifold 20 can be analogized to the "cavities inlet end cap" and "cavities outlet end cap" of claim 8. In regard to the Benson et al. patent, Applicant can find no prior reference to this patent in the record of the file. Applicant respectfully requests the patent number of the Benson et al. patent be provided so that Applicant may review the patent that is being referred to in the Office Action. Nevertheless, because the Benson et al. patent is being applied in the Office Action to disclose the use of a fin in a microtube, Applicant respectfully submits that independent claim 8 distinguishes over Hamilton '037 in view of Benson et al. as applied, and requests that the 35 U.S.C. §103 rejection of independent claim 8 be withdrawn.

Claims 9, 27-28, 33, and 38 are dependent upon and include the limitations of independent claims 8. For at least the reasons as discussed with respect to independent claim 8, Applicant respectfully submits that claims 9, 27-28, 33, and 38 also distinguish over Hamilton '037 in view of Benson et al. as applied and requests that the 35 U.S.C. §103 rejection of claims 9, 27-28, 33, and 38 be withdrawn.

Claims 10-11 stand rejected under 35 U.S.C. §103 as being unpatentable over Hamilton '037 in view of Benson et al. as applied to claims 8-9, 27-28, 33, and 38 above, and further in view of Hamilton '558 as applied to claims 1, 3, 6, 21, 25-26, 29-32, and 37 above. Claims 10-11 are dependent upon and include the limitations of independent claim 8. As discussed in regard to claim 8, Applicant submits that claim 8 distinguishes over Hamilton '037 in view of Benson et al. Applicant submits that Hamilton '558 also fails to teach or suggest the aforementioned features of claim 8. Therefore, for at least the foregoing reasons, Applicant respectfully submits that claims 10-11 distinguish over Hamilton '037 in view of Benson et al. as applied and in further view of Hamilton '558, and requests that the 35 U.S.C. §103 rejection of claims 10-11 be withdrawn.

Claims 22-23 stand rejected under 35 U.S.C. §103 as being unpatentable over Hamilton '037 in view of Hamilton '558 as applied to claims 1, 3, 6, 21, 25-26, 29-32, and 37 above, and further in view of U.S. Patent No. 5,285,347 to Fox et al. ("Fox"). Claims 22-23 are dependent upon and include the limitations of independent claim 21 and independent claim 1, respectively. As previously discussed, independent claim 1 and independent claim 21

distinguish over Hamilton '037 in view of Hamilton '558. Applicant submits that Fox fails to cure the deficiencies of Hamilton '037 and Hamilton '558. Figures 4-6 of the cited portion of Fox describe a system for cooling heat generating component on a printed circuit board. However, Applicant submits that Fox fails to teach or suggest at least the features of the "cavities inlet end cap" and the "cavities outlet end cap" of claims 1 and 21. Therefore, for at least the foregoing reasons, Applicant respectfully submits that claims 22-23 distinguish over Hamilton '037 in view of Hamilton '558 as applied to claims 1, 3, 6, 21, 25-26, 29-32, and 37, and in further view of Fox, and requests that the 35 U.S.C. §103 rejection of claims 22-23 be withdrawn.

Claim 24 stands rejected under 35 U.S.C. §103 as being unpatentable over Hamilton '037 in view of Benson et al. as applied to claims 8-9, 27-28, 33 and 33 above, and further in view of Fox as applied to claims 22-23 above. Claim 24 is dependent upon and includes the limitations of independent claim 8. As previously discussed, independent claim 8 distinguishes over Hamilton '037 in view of Benson et al. Applicant submits that Fox fails to cure the deficiencies of Hamilton '037 and Benson et al. Figures 4-6 of the cited portion of Fox describe a system for cooling heat generating component on a printed circuit board. However, Applicant submits that Fox fails to teach or suggest at least the features of the "cavities inlet end cap" and the "cavities outlet end cap" of claims 8. Therefore, for at least the foregoing reasons, Applicant respectfully submits that claim 24 distinguishes over Hamilton '037 in view of Benson et al. as applied to claims 8-9, 27-28, 33 and 38, and in further view of Fox, and requests that the 35 U.S.C. §103 rejection of claim 24 be withdrawn.

Claims 34 and 36 stand rejected under 35 U.S.C. §103 as being unpatentable over Hamilton '037 in view of Hamilton '558 as applied to claims 1, 3, 6, 21, 25-26, 29-32 and 37 above, and further in view of U.S. Patent No. 6,032,726 to Wright et al. ("Wright"). The Office Action alleges that "Hamilton '037 as modified, discloses all the claimed features of the invention with the exception of the claimed diameter." The Office Action further alleges that Wright discloses "that it is known to have the claimed diameter for the purpose of effectively transferring heat and facilitating extrusion", and that "it would have been obvious at the time the invention was made to a person having ordinary skill in the art to employ in Hamilton et al. ('037) as modified, the claimed diameter for the purpose of effectively transferring heat and

facilitating extrusion as disclosed in Wright et al.” Claims 34 and 36 are dependent upon and include the limitations of independent 1 and 21, respectively. As previously discussed, independent claim 1 and independent claim 21 distinguish over Hamilton ‘037 in view of Hamilton ‘558. Applicant submits that Wright fails to cure the deficiencies of Hamilton ‘037 and Hamilton ‘558. Wright describes a process for fabricating a liquid cold plate using a metal extrusion designed with internal fluid channels. However, Applicant submits that Wright fails to teach or suggest at least the features of the “cavities inlet end cap” and the “cavities outlet end cap” as claimed in claims 1 and 21. Therefore, for at least the foregoing reasons, Applicant respectfully submits that claims 34 and 36 distinguish over Hamilton ‘037 in view of Hamilton ‘558 as applied to claims 1, 3, 6, 21, 25-26, 29-32, and 37, and in further view of Wright, and requests that the 35 U.S.C. §103 rejection of claims 34 and 36 be withdrawn.

Claim 35 stands rejected under 35 U.S.C. §103 as being unpatentable over Hamilton ‘037 in view of Benson et al. as applied to claims 8-9, 27-28, 33 and 38 above, and further in view of Wright as applied to claims 34 and 36 above. Claim 35 is dependent upon and includes the limitations of independent claim 8. As previously discussed, independent claim 8 distinguishes over Hamilton ‘037 in view of Benson et al. Applicant submits that Wright fails to cure the deficiencies of Hamilton ‘037 and Benson et al. Wright describes a process for fabricating a liquid cold plate using a metal extrusion designed with internal fluid channels. However, Applicant submits that Wright fails to teach or suggest at least the features of the “cavities inlet end cap” and the “cavities outlet end cap” as claimed in claim 8. Therefore, for at least the foregoing reasons, Applicant respectfully submits that claim 35 distinguishes over Hamilton ‘037 in view of Benson et al. as applied to claims 8-9, 27-28, 33 and 38, and in further view of Wright, and requests that the 35 U.S.C. §103 rejection of claim 35 be withdrawn.

Should the Examiner have any further questions or comments facilitating allowance, the Examiner is invited to contact Applicant’s representative indicated below to further prosecution of this application to allowance and issuance.

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue.

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Respectfully submitted,

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